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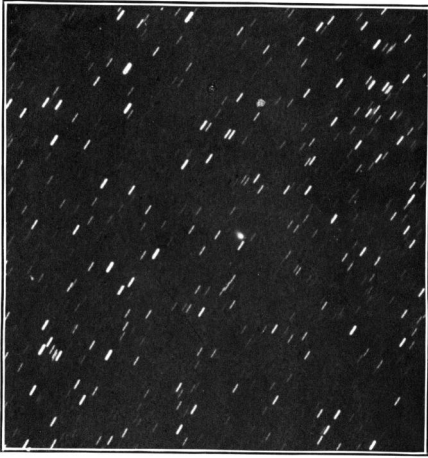
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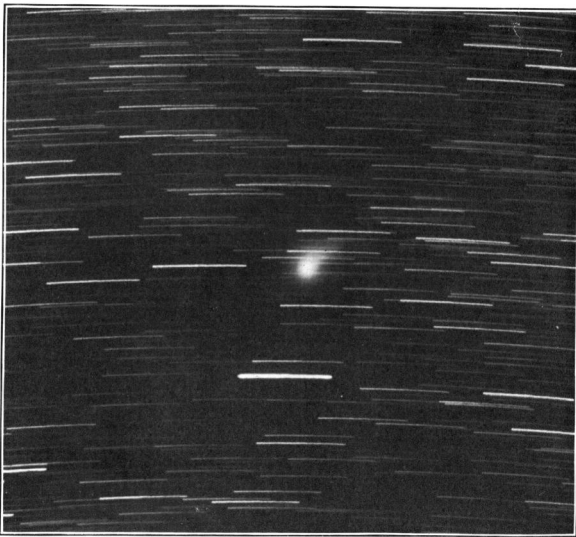
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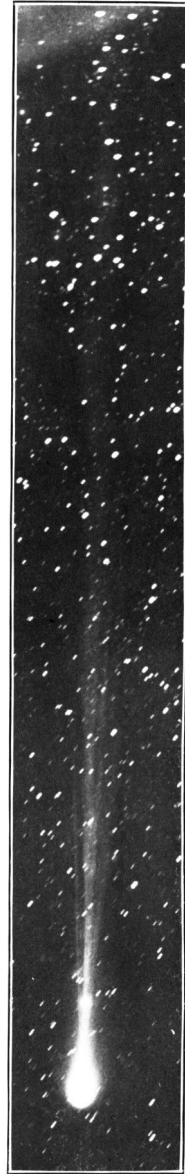
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1902. Sept. 3



1902. Sept. 30



1902. Oct. 31

COMET b, 1902 (PERRINE)

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PHOTOGRAPHIC OBSERVATIONS OF COMET *b*  
1902 (PERRINE).

BY R. H. CURTISS.

At the time of its discovery, September 1, 1902, this comet was of the 9th magnitude, with a fairly sharp nucleus of magnitude  $10\frac{1}{2}$  or 11. As the preliminary orbit predicted an interesting career for the visitor, it was decided to make a series of photographs at intervals, depending upon the degree of activity developed.

For this work the Pierson (Dallmeyer) camera of 15<sup>cm</sup> aperture and 82.6<sup>cm</sup> equivalent focal length seemed best adapted, the more so because of its superior driving and guiding facilities. This instrument is mounted in parallel with the Floyd telescope of 12.5<sup>cm</sup> aperture and 200<sup>cm</sup> focal length, and the combination is carried by a Warner & Swasey mounting. The Floyd is provided with a guiding eye-piece with adjustable electrical illumination. Though of rather high power, this eye-piece has been found particularly useful in guiding on faint objects. In the case of this comet, the intersection of two fine cross-wires was the reference-point in guiding.

As the comet brightened, it was decided to make simultaneous large-scale photographs with the Floyd telescope, which may be adapted for photographic purposes by reversing the crown-lens. The focal length is then 178<sup>cm</sup>. An additional telescope of 7<sup>cm</sup> aperture and 95<sup>cm</sup> focal length was added to the combination, the guiding arrangements being transferred to this smaller instrument.

The scale of the negatives reproduced is 0°.693 per cm at the center of plate, and, at the distance (*d*) in cm from the

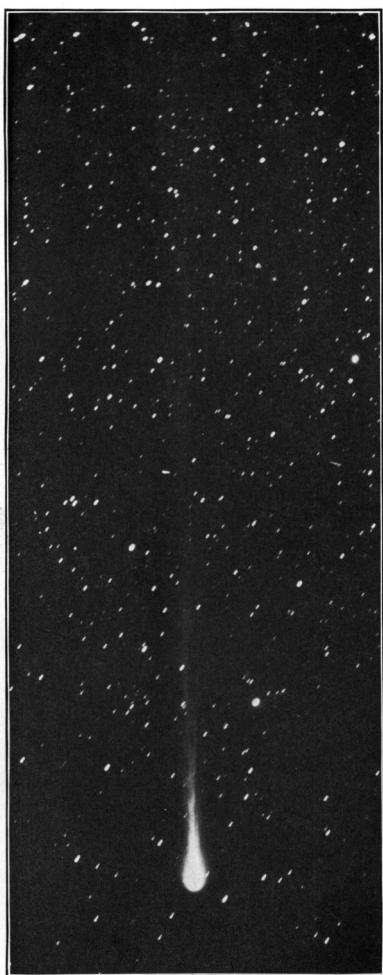
center, the scale value is  $\frac{4730}{6820+d^2}$  degrees per cm. In all the copies the scale of the original has been preserved.

In all, eighteen exposures were made in a total of fifty hours. Eighteen negatives were secured with the Pierson camera and fourteen with the Floyd. The exposure on any night was as long as circumstances would allow, ranging from 25 minutes to 6 hours.

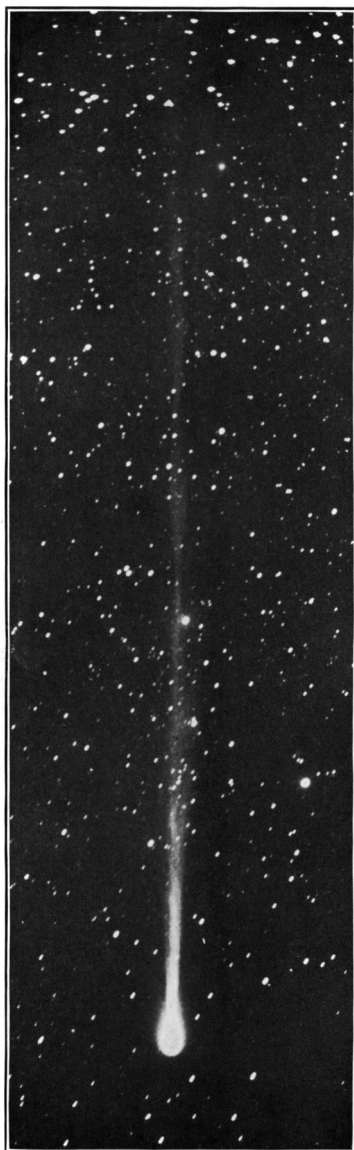
Owing to uncertainties incident to varying sky and unequal exposures, and because of the difficulty of assigning any definite termination to a gradually fading comet-tail, a detailed study of the changes in the length of the tail is perhaps of little interest. The accompanying cuts will illustrate in a general way the nature of such changes. With an exposure of four hours on September 3d, the length of the tail recorded is 3<sup>mm</sup>; on September 25th, 2<sup>cm</sup>. On October 7th the longer tail can be traced for 7<sup>cm</sup>, and finally, in the latter part of October, it runs clearly to the edge of the plate, a distance of 16<sup>cm</sup>, or 11°, through regions blurred by aberration. On November 1st, the tail of this comet was certainly more than sixteen million miles long.

The changes in structure of the tail between successive exposures are most interesting on the plates after October 7th. In the case of the earlier negatives no clear details are to be expected, on account of the faintness of the tail and the changes in its form during the long exposures. The secondary tail is clearly seen on the first negative of long exposure (September 3d). The primary tail appears very nearly straight on all the plates while the other is curved and much shorter than the straight tail, though nearly as bright. On the plate of October 7th, the secondary tail is clearly identified for the last time.

The negatives from October 25th to November 2d, inclusive, show much interesting detail. The comet at that time was within a month of perihelion passage, and therefore in very active condition. With the purpose of determining the velocity of motion of any given point in the tail with reference to the head, I have tried to identify any condensation or configuration on successive nights, but so complete was the change in a day that nothing of the kind was possible.



1902. Nov. 1



1902. Nov. 2

COMET b, 1902 (PERRINE)

The plate of October 25th shows three main streamers, of which the central one is brightest and longest. The tail splits up into two streams close to the head. The fainter one is straight, while the brighter one curves away a little and divides into two straight streamers. On the following night the fainter streamer has nearly disappeared. No other streamers appear, but the main tail suddenly spreads about  $3^{\text{cm}}$ , or  $2^{\circ}$ , from the head to six times its width near the coma, and a rift appears in the center of this thicker portion. On October 27th several new streamers appear. On the negative of October 31st as many as eight distinct streamers can be seen. They extend about  $7^{\text{cm}}$  from the head, while the main tail continues  $16^{\text{cm}}$  to the edge of the plate. On the following night these streamers have faded, while on November 2d there is but one connected with the main tail, which has straightened out to a narrow bright streamer of varying width.

On the earlier negatives, the nucleus is sharp and clearly defined. It is surrounded with a layer of nebulous matter. As the comet approaches the Sun, the nucleus spreads, and the layer of nebulous matter seems to diminish in thickness while a heavy fan-shaped spray appears on the side of the head away from the Sun.

A table of exposures appears below. After September 25th, negatives were made simultaneously with the Pierson and Floyd cameras. The times of beginning and ending are expressed in Pacific standard time:—

Date.	Beginning.	End.	Date.	Beginning.	End.
1902.			1902.		
September 1...	12.40	13.05	October 26...	6.45	8.35
3...	12.10	16.33	27...	6.32	8.23
10...	12.08	16.10	28...	6.25	8.13
25...	8.10	12.50	29...	6.27	8.07
30...	11.42	16.42	31...	6.19	7.54
October 3...	9.15	15.00	November 1...	6.25	7.40
4...	9.26	15.25	2...	6.25	7.32
7...	10.05	14.25	4...	6.35	7.15
25...	7.00	8.45	5...	6.37	7.00